

Subject card

Subject name and code	Unlocking the Secrets of Life: Spectroscopy in Bioinorganic Chemistry, PG_00191479						
Field of study	Chemistry						
Date of commencement of studies	October 2025	Academic year of realisation of subject			2026/2027		
Education level	Master's studies	Subject group			Optional subject group		
Mode of study	full-time studies	Mode of delivery			at the university		
Year of study	2	Language of instruction			English		
Semester of study	3	ECTS credits			4.0		
Learning profile	academic	Assessment form			credit		
Conducting unit	Laboratory of Intermolecular Interactions -> Department of Bioinorganic Chemistry -> Faculty of Chemistry -> Rector						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. Agnieszka Chylewska				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	0.0	0.0	30.0	0.0	0.0	30
	E-learning hours included: 0.0						
Learning activity and number of study hours	Learning activity	Participation in didactic classes included in study plan	Participation in consultation hours	Self-study			SUM
	Number of study hours	30	10.0	60.0			100
Subject objectives	<p>The aim of the course is:</p> <ul style="list-style-type: none"> - to familiarize students with fundamental methods of chemical and physicochemical analysis used in spectroscopic studies of bioinorganic chemical systems. - to give the students an idea of the importance and significance of chemistry in our lives and body; - to develop specific interests, habits, and abilities encompassing all sciences; - to help the student discover whether he/she has an aptitude for further work in pure or applied sciences and to induce such people to continue science studies <p>Students will learn laboratory procedures, including safety rules, calibration techniques, acid-base equilibrium analysis, and methods for determining stoichiometry and kinetic parameters involving coordination compounds. They will also gain skills in applying potentiometry to determine the composition of coordination compounds based on the presence of chloride ions in the studied substance's formula.</p>						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[CHEMMU2_U05] Presents the results of research in the form of an independently written paper containing a description and justification of the purpose of the work, adopted methodology, results and their significance in comparison to other similar research.	The student presents research results in the form of an independently written paper, which includes a clear description and justification of the research aim, the adopted methodology, results, and their interpretation in the context of existing studies, demonstrating the ability to critically analyze literature and formulate conclusions.	[SU4] test/exam - oral or written
	[CHEMMU2_K01] Knows the limitations of her/his own knowledge; understands the need for further education and can inspire other people to do so.	The student recognizes the limitations of their knowledge, demonstrates a willingness to deepen it, and independently acquires new skills. They understand the importance of lifelong learning and can inspire others to develop their competencies in chemical analysis.	[SK4] test/exam - oral or written
	[CHEMMU2_U01] Plans and implements chemical experiments of medium complexity.	The student is able to plan and conduct chemical experiments of increased complexity, selecting appropriate analytical methods and research techniques, and interpreting the obtained results in the context of chemical theories.	[SU3] text preparation/written work
	[CHEMMU2_U03] Finds necessary information in specialist literature, databases and other sources, lists basic scientific journals in chemistry.	The student is able to search for necessary information in professional literature, databases, and other sources, and is familiar with and can list the key scientific journals in the field of chemistry, using them to deepen their knowledge and complete scientific tasks.	[SU3] text preparation/written work
	[CHEMMU2_W09] Classifies specialist IT tools used in statistical evaluation of experiment results.	The student is able to classify specialized software tools used in the statistical analysis of experimental results, understands their functions, and selects the appropriate software for analyzing experimental data based on the nature of the study.	[SW3] text preparation/written work
	[CHEMMU2_K06] Undertakes research tasks consciously and responsibly, understanding the social aspects of the practical application of the acquired knowledge and skills and the responsibility related to it.	The student consciously and responsibly undertakes research tasks, considering the social aspects of the practical application of acquired knowledge and skills, and understands the associated responsibility for the impact of their actions on society and the environment.	[SK3] text preparation/written work
	[CHEMMU2_W03] Demonstrates extended knowledge in the field of modern measuring techniques used in chemical analysis.	The student demonstrates an in-depth knowledge of modern measurement techniques used in chemical analysis, understands their principles, applications, and limitations, and is able to critically evaluate the results obtained using these techniques.	[SW3] text preparation/written work
	[CHEMMU2_W01] Uses knowledge of spectroscopic methods of chemical compound analysis.	The student applies in-depth knowledge of spectroscopic methods for the analysis of chemical compounds, understands their principles, applications, and limitations, and can use appropriate spectroscopic techniques to analyze various types of chemical compounds.	[SW3] text preparation/written work

Subject contents	<p>Introduction, materials and safety rules in the laboratory, spectroscopic methodology, procedures and duties explanation.</p> <p>Calibration curves role in research the case of studies.</p> <p>Acid-base equilibria of (bio)inorganic and organic ligands (determination of pKa values).</p> <p>Jobs plots to establish stoichiometry of metal complexes with bioligands.</p> <p>Kinetic parameters and activation energy determination of processes involving coordination compounds.</p> <p>Potentiometric determination of coordination compound formula based on the presence of chloride ions.</p>														
Prerequisites and co-requisites															
Assessment methods and criteria	<table border="1"> <thead> <tr> <th data-bbox="451 640 794 678">Subject passing criteria</th> <th data-bbox="794 640 1139 678">Passing threshold</th> <th data-bbox="1139 640 1487 678">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="451 678 794 712">30% Post-Lab reports</td> <td data-bbox="794 678 1139 712">30.0%</td> <td data-bbox="1139 678 1487 712">30.0%</td> </tr> <tr> <td data-bbox="451 712 794 745">10% Lab Technique</td> <td data-bbox="794 712 1139 745">10.0%</td> <td data-bbox="1139 712 1487 745">10.0%</td> </tr> <tr> <td data-bbox="451 745 794 786">60% Pre-Lab test</td> <td data-bbox="794 745 1139 786">60.0%</td> <td data-bbox="1139 745 1487 786">60.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade	30% Post-Lab reports	30.0%	30.0%	10% Lab Technique	10.0%	10.0%	60% Pre-Lab test	60.0%	60.0%
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Example issues/ example questions/ tasks being completed	Werner complexes; the significance of coordination compounds with transition metal ions; spectroscopic methods (UV-Vis, ATR) in studies involving coordination compounds (determining formulas; interactions with biomolecules); chemistry of d-block metal complexes; stability of coordination bonds; the role of metal complexes in medicine.														
Work placement	Not applicable														

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